

if (i == j)

z = 0;

else

z = 1;

Compiler notes

↳ \tif (i == j) \n \t \t z = 0; \n \t else \n \t \t z = 1;

identifier → string of letters or digits, start with a letter

integer → non-empty string of digits.

Keyword → else, if, begin, ...

Whitespace → non empty sequence of blanks, newlines and tabs.

☒ X X = 0; \n \t while (X < 10) { \n \t X++ \n }

Keyword ⇒ 1 (while)

identifier ⇒ 3 ⇒ X three times.

other tokens { { }, (), <, ++, ;, == } ⇒ 9

Whitespace ⇒ 9

$$a^* = a + a' + a^2 + \dots + a^n$$

$$a = \epsilon, a' = a, a^2 = aa, a^3 = aaa$$

$$a + b = \{ "a", "b" \}$$

$$ab = \{ "ab" \}$$

$$a^* = \{ \epsilon, "a", "aa", "aaa", \dots \}$$

$$(0 + 1)^* = \{ \epsilon, 0, 1, 01, 10, 00, 11, 000, 010, 110, 101, \dots \}$$

[Ex] Twelve hour times of the form "04:13 PM"
 Minutes should always be two digit number,
 but hours may be single digit

$$[a] \underbrace{(0 + 1)^* [0-9] : [0-5] [0-9]}_{\downarrow} (AM + PM)$$

لو النظام ده غلط لأنه في أدل حاجة

أخذناها من جدول الساعة 19 واحنا على نظام 12 ساعة

[a]

b

$$((0+\epsilon)[0-9] + 1[0-2]) : [0-5][0-9] (AM+PM)$$

↓
0r
↓
حتى الساعة
12

← النظام سليم ومطابق للعايزينه .

c


$$(0^*[0-9] + 1[0-2]) : [0-5][0-9] (AM+PM)$$

$$0^* \Rightarrow 00:01 \quad \text{XX}$$

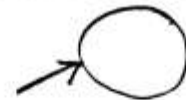
← النظام ده غير مطابق

$$d) 0?[0-9] + 1(0+1+2) : [0-5][0-9] (A+P)M$$

له غير مطابق

* state \Rightarrow 

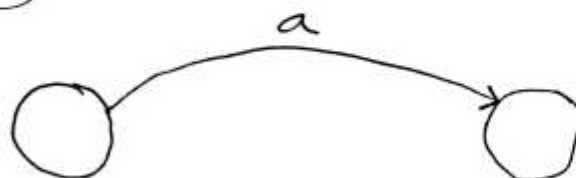
* start state



* accept state

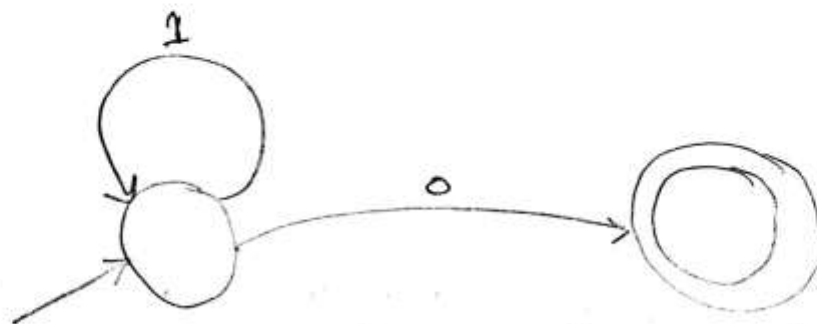
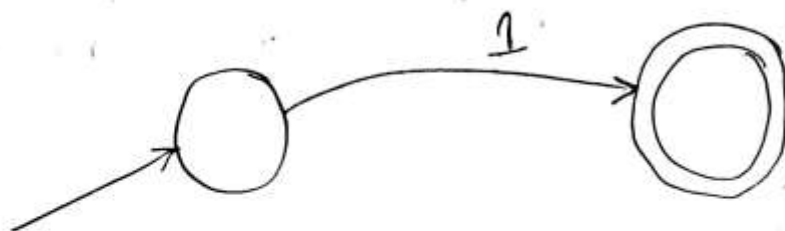


* transition



2

→ Finite automata accepts only one "1"



→ Accept any number of 1's followed by single 0.

* Deterministic Finite Automata (DFA)

a) one transition per input per state.

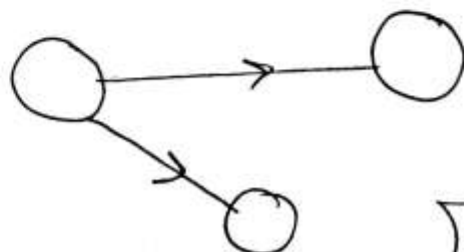
b) No ϵ moves.



* Non-deterministic Finite Automata (NFA)

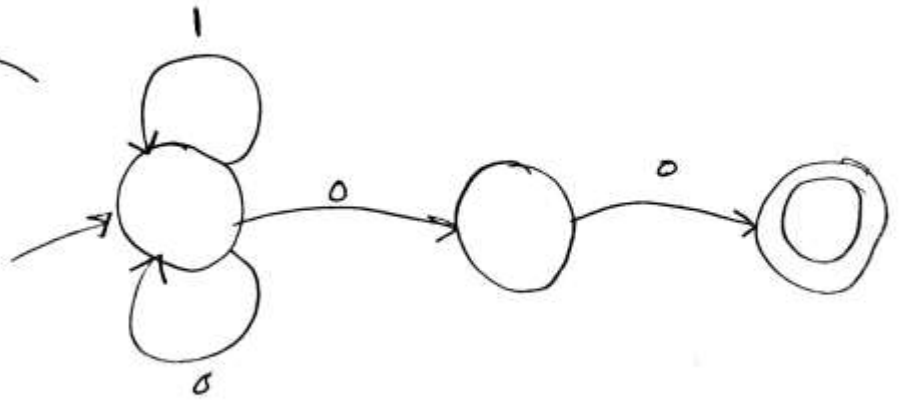
a) Can have ϵ moves

b) multiple transitions for one input in a given state

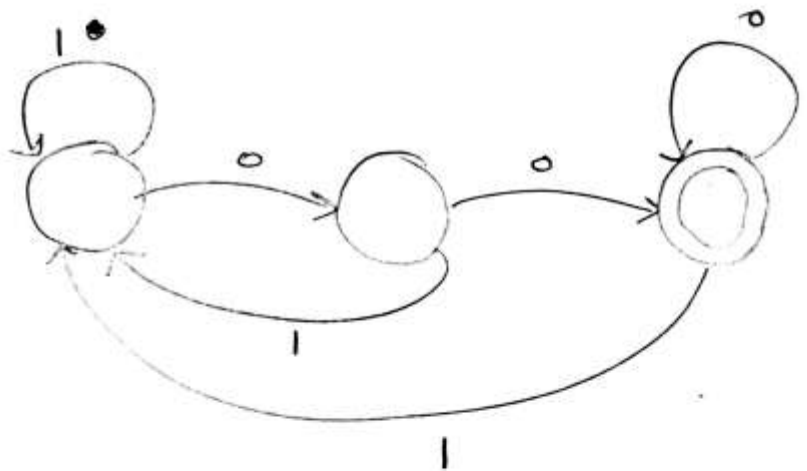


NFA

عشان بعد 2-transition
لا (zero) في البداية .



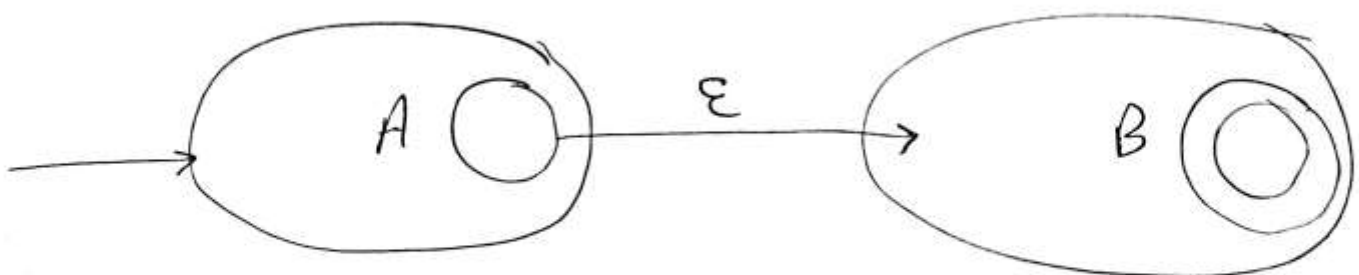
DFA



Accepted — لو آخر حالة فيها (accept state)

Rejected — لو وصلت للنهاية وعرفت (Accept state) .
 لو لم أصل حتى نهاية الـ (string) حتى لو وصلت (Accept state) .

AB

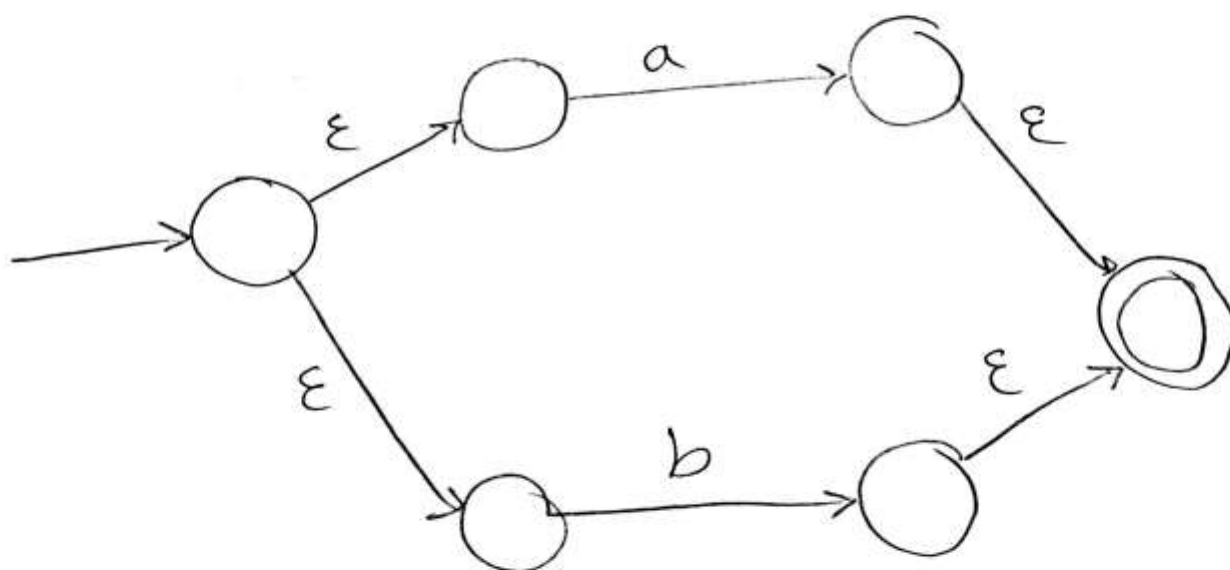
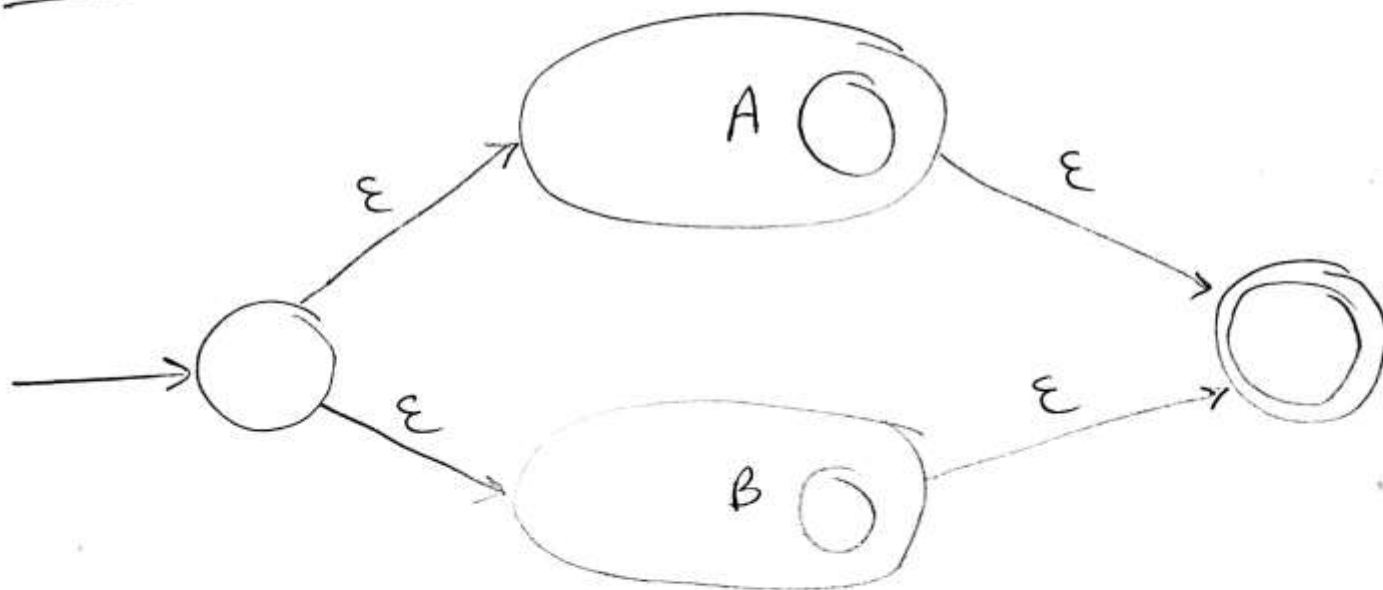


5

AB

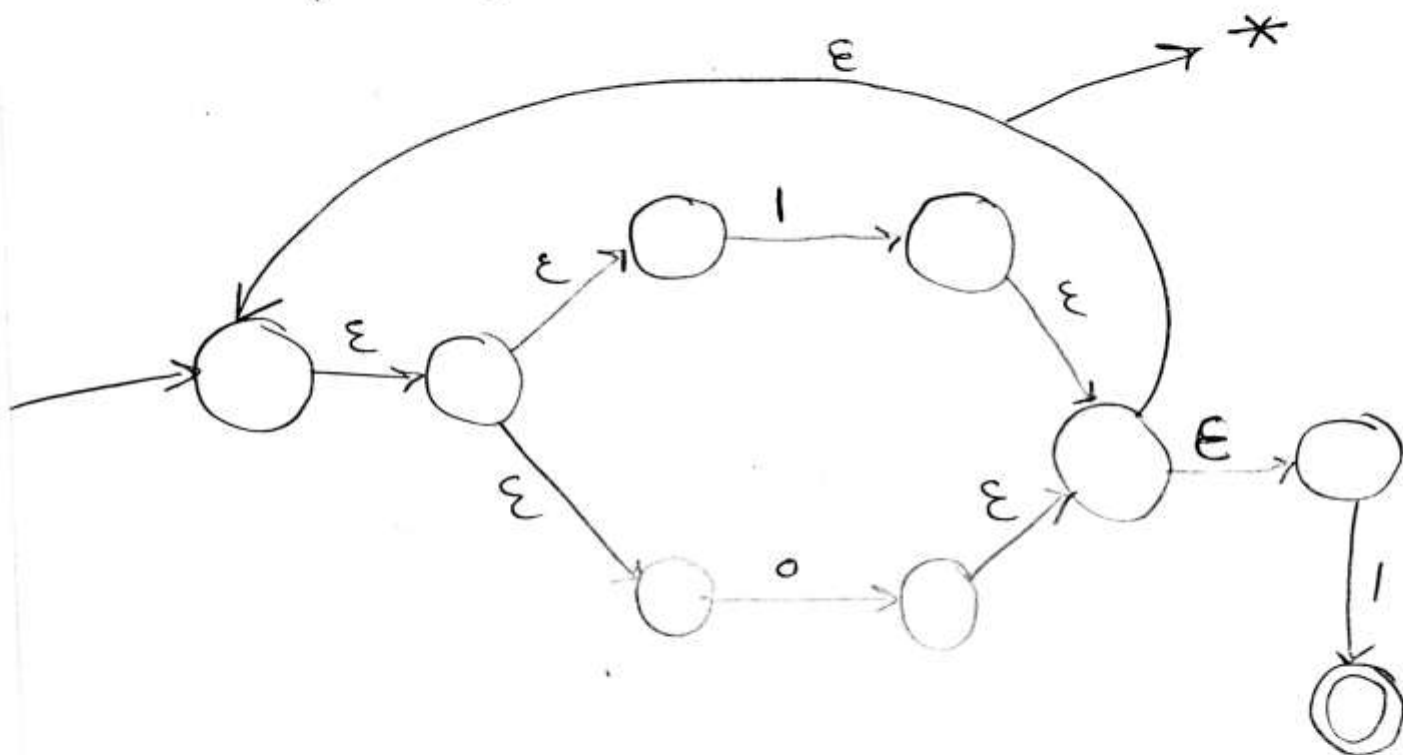


A + B

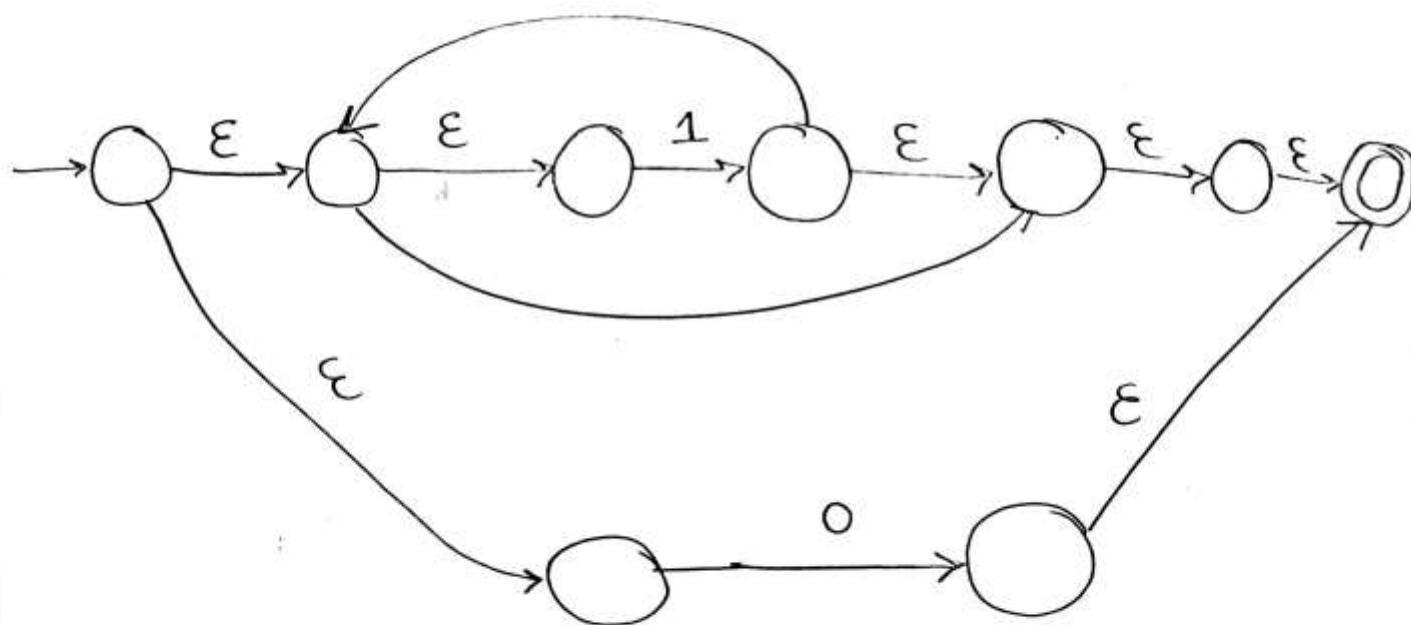


[8]

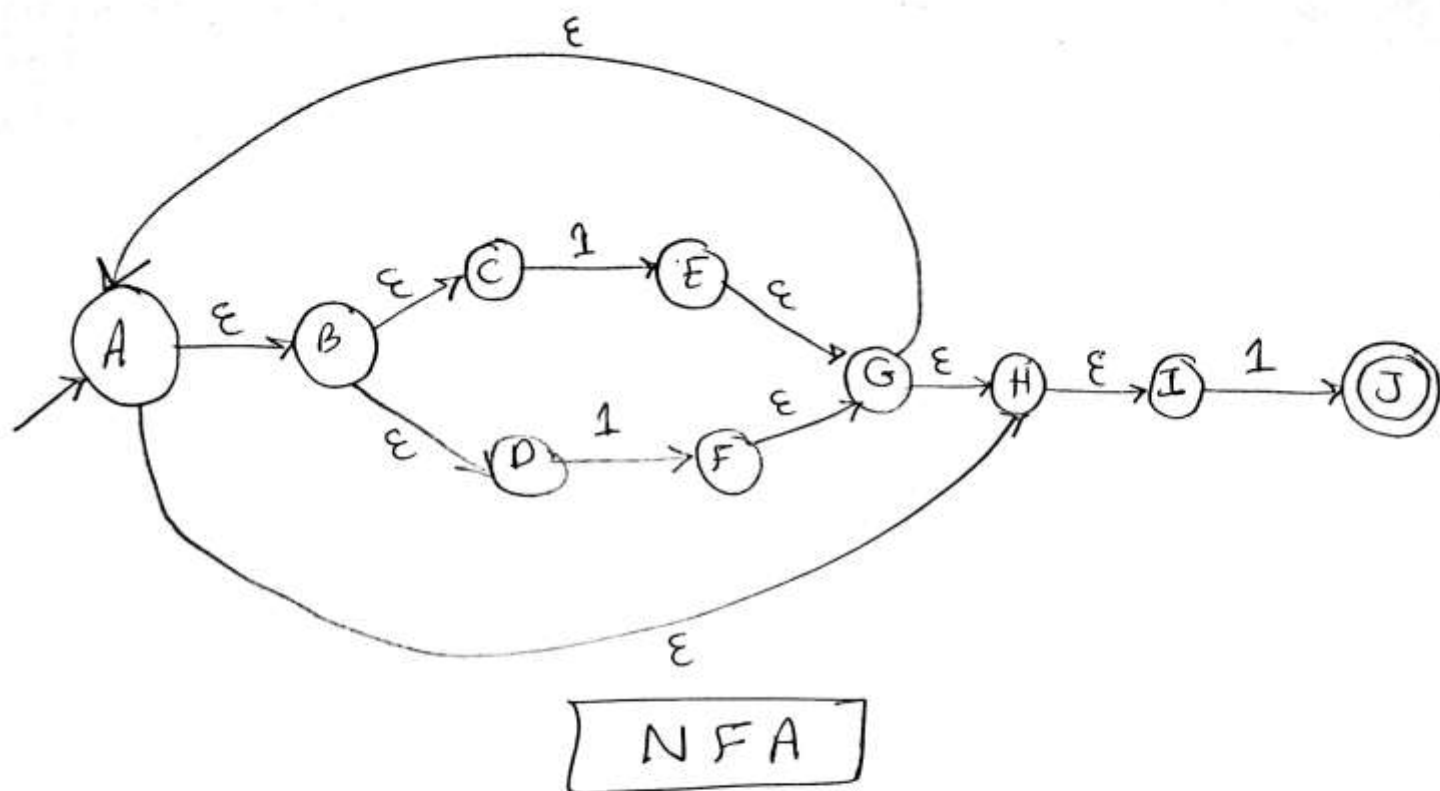
$$\Rightarrow (1+0)^* 1$$



$$\Rightarrow 1^* + 0$$



7



ϵ -closure $\{s\}$

← كل ال (states) التي تقدر توصلها من ال State s من غير ما تقبل Consuming

$$\epsilon\text{-closure} \{B\} = \{B, C, D, A\}$$

$$\epsilon\text{-closure} \{G\} = \{G, H, I, A, B, C, D\}$$

$a(X)$ → set of states

~~ϵ -closure~~

X

← و كل حرف من غير ليس y or x (small character)

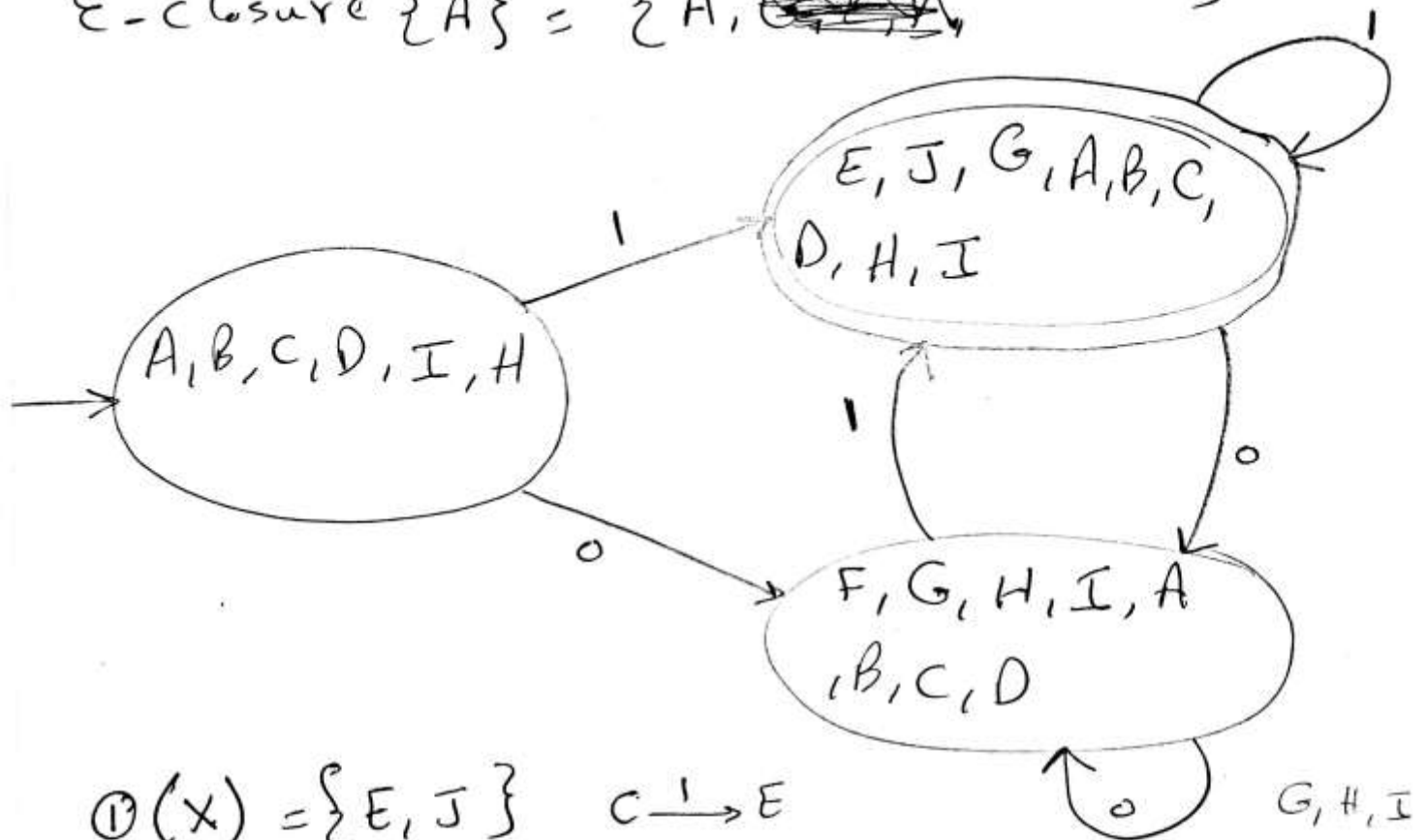
$$\alpha(X) = \{y \mid x \in X_n \quad x \xrightarrow{a} y\}$$

$$= Y$$

حسب عبارت
 ϵ -closure $\{Y\}$

→ To transform previous Drawing From NFA to DFA

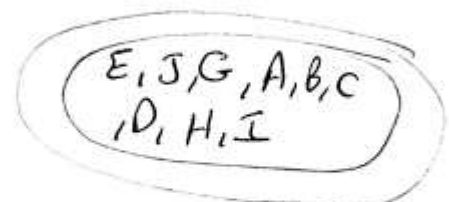
$$\epsilon\text{-closure}\{A\} = \{A, \cancel{B, C, D, H, I}\}$$



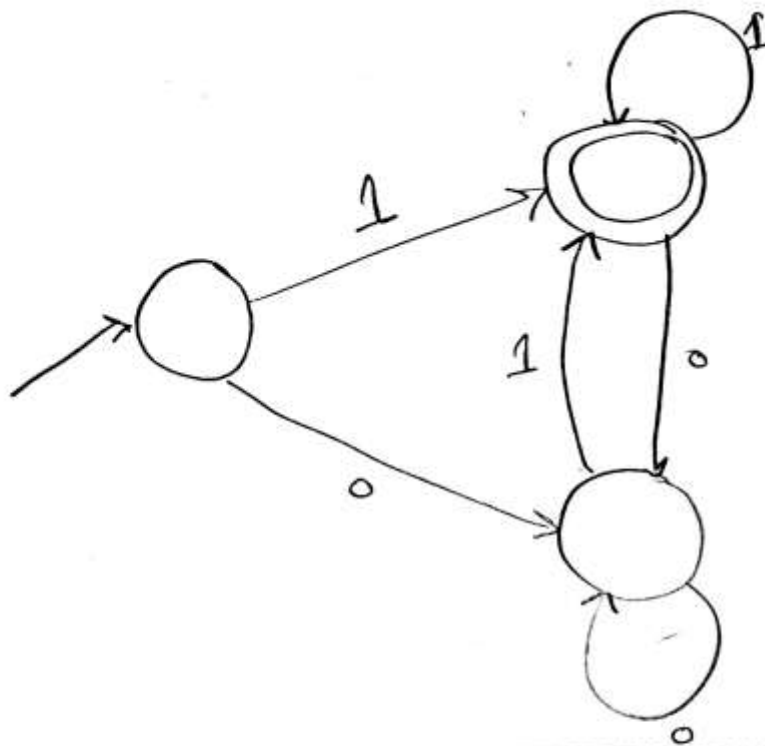
$$\textcircled{1}(X) = \{E, J\} \quad \begin{array}{l} C \xrightarrow{1} E \\ I \xrightarrow{1} J \end{array}$$

$$\epsilon\text{-closure}\{\textcircled{1}(X)\}$$

$$\epsilon\text{-closure}\{E, J\}$$

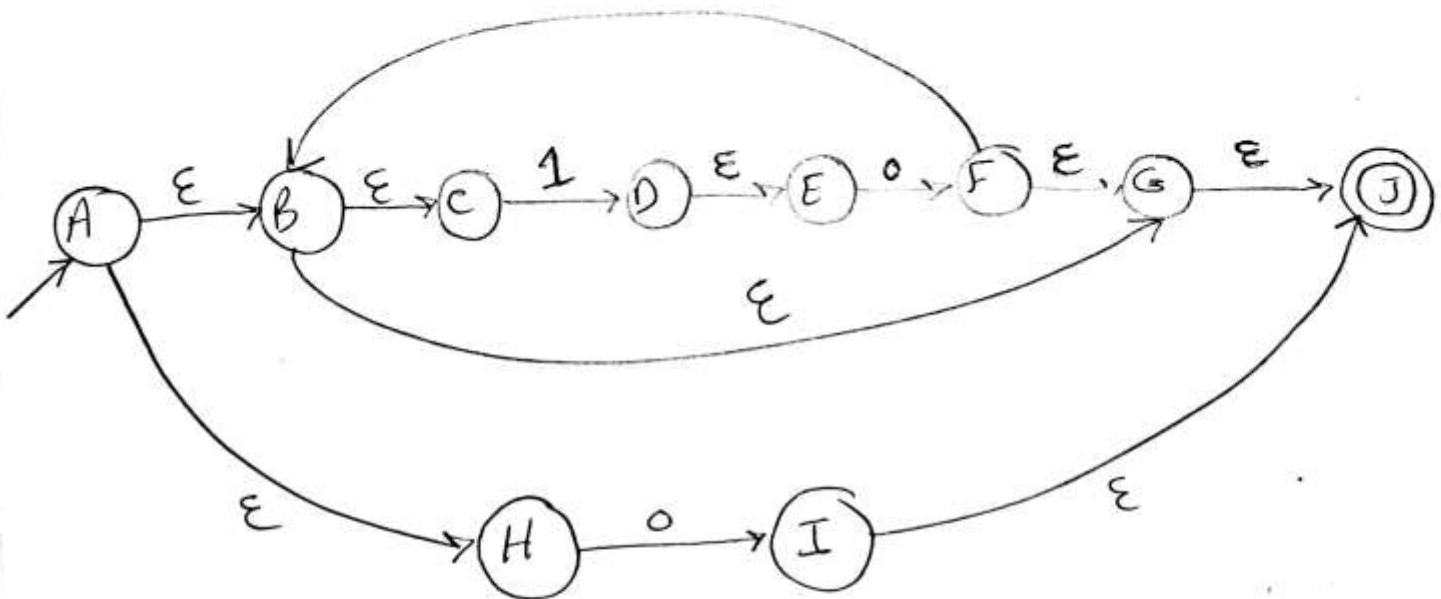


عبارت E, J من
 $\textcircled{1}(X)$ محسوب می شود
 و $\epsilon\text{-closure}$ می باشد



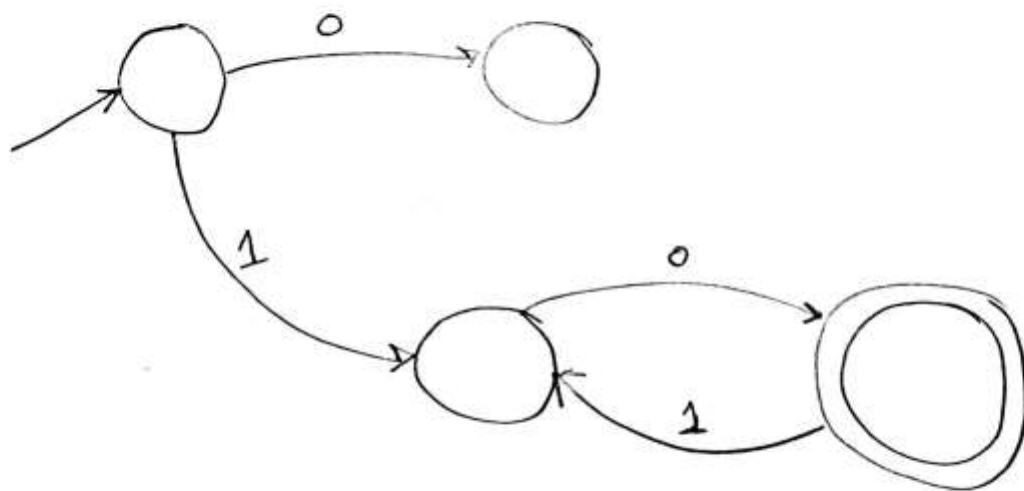
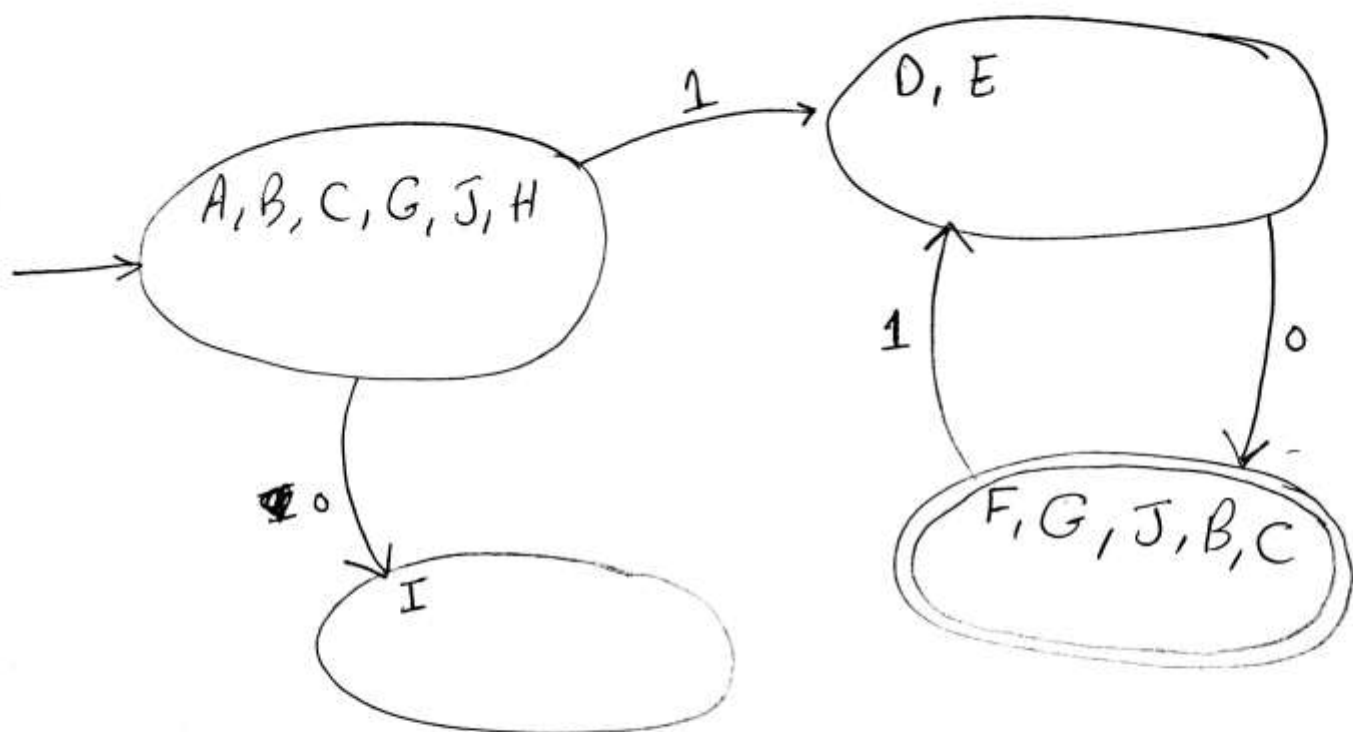
DFA
النتائج

EX



$$\epsilon\text{-closure}\{A\} = \{A, B, C, G, J, H\}$$

10



□ ~~See~~